

The WNY High Performance Networked Video Initiative

Introduction and Overview

The Western New York High Performance Networked Video Initiative (WNY-HPNVI) is a public service initiative of the University at Buffalo (UB). It is directed at enabling the potential of high quality Internet video technologies to improve service delivery from the educational, medical, and government institutions of Western New York to its citizens. Professionally staffed by UB with baseline operating budget, the WNY-HPNVI is a voluntary association of the early adopters of HPNV technologies along with their business supporters and business partners. The membership now spans and is supported by more than twenty institutions and businesses, many of them naturally competitive. It has achieved considerable success in demonstrating the potential and promise of HPNV in low-cost developmental contexts and in enabling members to proceed rapidly to full-scale funded deployments that deliver real services to the Western New York community.

High Performance Networked Video (HPNV) refers to business and medical grade video communication services carried over the Internet in addition to traditional Wide Area Network (WAN) carrier transport services. Not to be confused with low quality consumer grade Internet video conferencing and streaming video, HPNV approaches and surpasses commercial broadcast television quality standards. At these quality levels, and as costs and support complexities continue to decline, HPNV offers the promise of dramatic outreach to under-served communities at manageable costs for providers of government, education, and healthcare services. Indeed, it seems clear that HPNV, as it matures, will permeate virtually every human activity that is enhanced by person-to-person contact and will, in time, become as much a part of our ubiquitous information and communications infrastructure as telephony is today.

HPNV is enabled by a newly emerging and complex set of technologies, however, and the obstacles to successful deployments are severe. Global standards are still being defined, the computer technology necessary to support required quality levels at acceptable costs is only starting to appear in the market, and the necessary network and management technologies have not yet been scaled beyond small communities in idealized homogeneous environments. In consequence, the earliest practical deployment trials have been limited to the largest public institutions, such as NIH and NASA, and large high profit potential business sectors like banking and manufacturing. The WNY-HPNVI is demonstrating, however, that if the burdens are shared, the obstacles can be overcome or managed sufficiently to demonstrate the success potential of HPNV and to rapidly move towards early regional deployments that directly serve the public.

Two significant WNY trials of HPNV, in telemedicine and education, are a direct result of the expertise and practical solutions developed by WNY-HPNVI staff and membership: an Emergency Medicine Telemedicine initiative directed by UB faculty at the Erie County Medical Center (ECMC), and an initiative at UB's Millard Fillmore College (MFC) to develop collaborative instructional programs with other North American Universities and Colleges. The ECMC initiative now provides trauma, emergency and routine medical consultation services to over a dozen remote regional healthcare facilities in prisons. The MFC initiative recently demonstrated success with collaborative instructional programs with Stanford University and the University of California at Berkeley. In both cases, success was directly enabled by the systems and expertise developed by the WNY-HPNVI over the last few years. These and earlier WNY-HPNVI public successes have helped catapult regional HPNV early adopters to global visibility which, in turn, directly affects local abilities to secure additional funding and support for broader trials and deployments. As well, WNY-HPNVI system designs and technology that grew out of these efforts, freely available to all interested parties, are now being made available with full support through normal commercial distribution channels.

The WNY-HPNVI will direct most of its available staff and technical resources at one large-scale unifying project over the next year or two. This project, known as Extended Grand Rounds (EGR), will attempt to deploy and demonstrate all relevant HPNV technologies across heterogeneous groups of regional and global institutions, network technologies and endpoint systems in highly visible public demonstrations of state-of-the-art HPNV and its cost/benefit potentials. The project is centered on delivery of traditional medical Grand Rounds conferences using HPNV videoconferencing and streaming video with simultaneous consumer-grade Internet broadcast for broader public access. At a regional level, the University at Buffalo, the WNY Regional Community network, the Buffalo Independent Secondary Schools Network, the WNY Health Science Consortium Network, the Erie County Medical Center, and Buffalo General Hospital are already actively engaged in planning and preparation. Tentative interest has been expressed by the University of Rochester, Stanford University, Columbia University and SurfNet in the Netherlands. As the EGR project develops, we expect to facilitate open access to EGR content by forging

relationships and HPNV links with other regional and global HPNV early adopter support groups including the Ohio State University global Megaconference and SURA's Large Scale Video Network Prototype (LSVNP).

An open-access regional test-bed for HPNV development and trials, the WNY-HPNVI Sandbox, will be a lasting residual the EGR project. This Sandbox, now in development, will be made available to regional early adopters during the second quarter of this year. It will become the focal point for the EGR project as well as numerous smaller HPNV tests and trials throughout the region and will be located on a UB Internet-2 network segment with easy access to all regional networks with direct connectivity with the University. Given the relative ease with which HPNV success can be achieved on the Internet-2 transport fabric and the large number of potential Internet-2 sites with HPNV interests with whom collaborative partnerships can be readily forged, we expect that the availability of the WNY-HPNVI Sandbox itself will become a significant regional HPNV success enabling factor for several years to come.

Plans for the Sandbox include a fully equipped H.323 test endpoint with a continuous source of sound and video as well as loop-back capabilities, at least two H.323 Gatekeepers to explore H.323 Zone Neighboring issues, an H.323/H.320 Gateway with at least one single-BRI 128 Kbps and one triple-BRI 384 Kbps WAN interface, at least one H.323 Multipoint Conference Unit (MCU) to support multipoint real-time videoconferencing, at least one high performance MPEG-1 streaming video stored-content server, at least one high performance MPEG-1 streaming video broadcast server, a low performance (28-115 Kbps) streaming video combined broadcast and stored-content server appliance, and a pair of MPEG-1 streaming video bi-directional broadcast appliances for remote site origination support. In addition, a variety of H.323 endpoint demonstration systems and ancillary production equipment (audio mixers, video switchers, cameras, special purpose microphones, telephone hybrids, etc) maintained and supported by WNY-HPNVI members will be made available to supplement the Sandbox facilities for present and future regional tests and trials. Finally, in order to address security and authentication issues, now relevant to the medical community but likely to assume importance in education as well, and to explore extension of our I2 access to affiliated institutions, VPN support technology will be added as time and funding permit.

Metcalf's Law, that the value of a network is proportional to the square of the number of endpoints, applies to HPNV as much as any other network dependent technology. The full potential of HPNV for education, healthcare and government service delivery will not be realized within a community until broadband Internet service and HPNV infrastructure is ubiquitously available. Recent progress with cable-modem, DSL, and MDS land based technologies, and the promise of LEO satellite technologies suggest that ubiquitous broadband Internet service will be available in the near term at increasingly practical costs. As well, WNY is seeing new and larger deployments of ATM/IP networks with clearly appropriate inter-networking potential for HPNV applications. The WNY-HPNVI works to see that WNY education, healthcare and government institutions will not be impeded by HPNV technology or infrastructure issues as regional broadband network services emerge.

The nature of the WNY-HPNVI itself may even turn out to be worthy of closer examination as ever-growing and nearly overwhelming technological complexity and expense impede public benefit and service institutions in their attempts to capitalize on high potential service delivery technologies. Our initiative is uniquely characterized by:

1. A small shared highly empowered and specialized staff working closely and directly with its constituency,
2. Unusually low funding levels relative to impact and benefit,
3. Near-complete elimination of bureaucratic impediments to and interference with rapid progress,
4. A clear and constant focus on developmental as opposed to production activities,
5. High levels of collaboration and mutual support among naturally competitive institutions,
6. Shared responsibility for just-in-time funding as needs arise with the voluntary financial support of business and institutional partners, and
7. A shared minimalist just-enough and just-long-enough ethos that seeks to enable progress without building its own expensive standing, and ultimately impeding, bureaucracy

If our success with the nascent EGR project follows past patterns, we expect to focus more attention on examining and promoting opportunities for applying this model in other geographic regions and possibly in other emerging technology areas. We believe that UB may have catalyzed a reproducible model for overcoming some of the cost and complexity obstacles to achieving the high ROI potentials of emerging complex information technologies.